

Converting LPs and VHS to digital

Are you desperate to wipe the dust from those old videos or vinyl albums? **Jon Thompson** explains how you can digitise your old favourites so they'll play on your PC and iPod

In countless spare rooms and attics, our once-cherished record collections are warping and slowly becoming unplayable. In living rooms, rows of videotapes containing precious memories sit gathering dust. Much of the equipment for playing older media has been consigned to the attic or a car boot sale in favour of shiny new CD and DVD players. With a little ingenuity, however, you can access your record and video collections as easily as if you were playing a CD or DVD.

Some companies will handle the conversions for you (see the 'Services rendered' box opposite), but it is cheaper to do it yourself. You'll need something to play the old media. If you've already thrown out your old stereo or video recorder, you'll need to ask a friend if they can lend you the basic equipment needed to play the records and tapes. Check the equipment and cables you already have access to, though, because this will help keep costs to a minimum. Studying what kit you already have will give you an idea of the best method of conversion to use.

Let's begin by exploring the options for transferring a VHS tape to DVD.

DIGITISING YOUR VIDEOTAPE

The simplest and most direct way to get content from videotape to DVD is to use a combined VHS and DVD recorder. Check that your device will let you do internal transfers between the tape and disc. Surprisingly, some machines don't allow this, and some seemingly suitable devices produce time index marks on the digitised video. For our purposes, clean transfers are a basic requirement, so check before you buy or borrow.

If you've already upgraded to a DVD-only recorder, it's still very simple to use this in conjunction with a

VHS machine. Newer models of video recorder should have an S-video output. This is a small, round, five-pin DIN socket, like the PS/2 sockets that connect to the keyboard and mouse leads on the back of a PC. S-video should provide the best signal, so if you have it use it.

If you don't have an S-video socket, you should be able to use a composite video connection. You'll have to connect three leads, usually colour-coded red, white and yellow, which correspond to right audio, left audio and video respectively. You could also connect the devices using a SCART cable.

BE CLEAN, BE SAFE

If a DVD recorder isn't available to you, or if you want to edit the video once it's in digital format, you can still transfer your tapes using an old VHS recorder but be aware of the following issues.

Old, unused or rarely maintained video recorders have a nasty habit of chewing tapes. To minimise the risk of yours chewing up the only copy of Auntie Nelly's 85th birthday party in existence, you should take a few precautions before putting the tape in the machine.

Take a dust buster to every nook and cranny of the video recorder you can find, including inside the tape slot, just in case there's a piece of fluff that might clog up the works and cause your precious memories to get crunched up. Pay special attention to ventilation slots. Clean the playback head, too. As VHS has become less popular many people have probably thrown away their old head-cleaning cassette, if they had one in the first place. You can still buy them from several online retailers, including www.maplin.co.uk, which sells a complete VHS cleaning kit for around £6.

Break off the write tabs on the videos you want to copy. It may seem highly unlikely that you'll hit record

INTRODUCTION

Formats for video and audio have changed dramatically over the past few years, and digital is clearly the way forward, particularly when you consider that some high street shops no longer stock video cassette recorders.

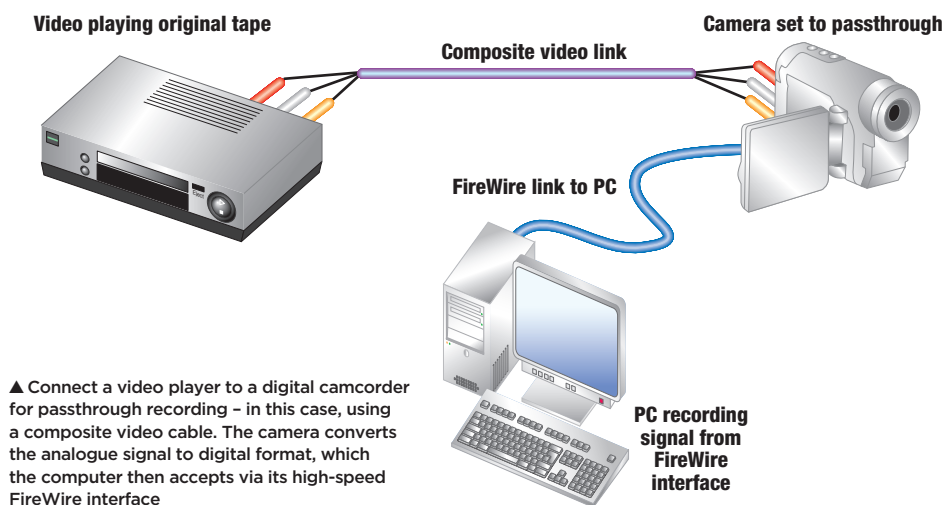
If you would like to convert your collection of vinyl and VHS tapes to digital so that they will play on your PC and gadgets such as video iPods, just read on. We'll show you a number of ways to do it, using different equipment and software.

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Film strip Using a digital camcorder to capture analogue video



instead of play, but accidents happen. If you are going to the effort of making a digital copy of this footage, it must be important and possibly unique, so play safe.

Connect the video recorder to a TV and then try playing an old tape in the machine, but not a valuable one. This ensures that the machine is still able to play after a long period of inactivity, and will also allow you to ascertain that it hasn't developed a taste for tapes.

THE DIGICAM CONNECTION

Once you have the VCR producing an output, you need to get it into your computer. There are a few options for getting the video into digital form. If you can beg, borrow or buy a digital camcorder equipped with a composite or S-video input and a FireWire output, you'll have something that can serve as the perfect stepping stone from VHS to digital. These devices don't usually have SCART connections, however. If your video has only a SCART socket on the back, you can buy a low-cost composite video converter for it. A quick scan with Google's Products search revealed one for just 99p sold by www.cablestar.co.uk.

Some camcorders can accept and retransmit signals using a technique called passthrough. You'll need to consult your manual to learn exactly how to set your particular model to do this. With a FireWire-equipped PC, you can then simply capture the camera's output as you would normally. If you have a camera that doesn't allow you to run it in passthrough mode, the alternative is to record the analogue signal into the camera and then play it back into the computer.

Many older video cameras used different sizes of tape, such as DAT. You can still salvage footage from these tapes using the original camera's output. Simply plug it straight into a digital camcorder in passthrough mode or a domestic DVD video recorder and proceed as before. If you don't have a FireWire connection on your camera (or your computer, for that matter), all is not lost. You can use a piece of dedicated video-capturing hardware to collect the output from your VHS recorder, which we'll explore next.

DEDICATED HARDWARE

Using dedicated hardware to transfer VHS to your computer can make life simple, but the

Services rendered Online conversions

If you don't like the idea of collecting and setting up obsolete hardware to get your vinyl and video collections into a digital format, there are a number of services that will do the job for you.

Some companies specialise in simply transferring whatever you give them to DVD or CD, but others (such as www.dvdmemories.co.uk) will also attempt to recover degraded or mangled videotapes. There can be no guarantee of success, but if the only copy of something precious has become damaged over the years then it might be worth finding out if it can be salvaged professionally.

There are other reasons for using a dedicated transfer service, too. If your videotapes are in a format you can no longer read because you can't find hardware to play them on, a dedicated transfer service could be the difference between losing and



▲ If you'd rather use a specialist company to transfer your videos to DVD, try Alive Studios (www.alivestudios-memories.co.uk)

salvaging media of times gone by. Prices for commercial video-to-DVD operations vary. The cheapest we found was just £5 per hour of tape (www.transfervideo.co.uk). Once the footage is in DVD format, you can extract and edit it yourself.

quality of the results you'll achieve depends on how good the device is. Video transfer hardware often contains its own onboard signal processing chips that work independently of your computer's processor. This takes the strain off your PC but also affects the quality of the output, hopefully for the better. Without this independent processing capacity, the device needs to rely on your computer's number crunching ability to encode video, which can cause problems if you have an older processor. You may find that scenes involving a lot of change between frames appear jerky.

If this is the case, and if your video has a sharpness control (a rare facility, but useful in this case), you can turn it down slightly to generate a softer picture. Several sources say that doing so will reduce or even prevent much picture jerkiness.

We've used the Terratec Grabster AV400 (£75, reviewed in *Shopper* June 2007) to transfer video directly into the computer. This little unit plugs into a USB port on your Windows computer, from which it also takes its power. It contains its own dedicated processor and comes with an S-video port as well as composite video inputs. The Grabster also comes with a

SCART-to-composite adaptor, which gives you plenty of connection options.

After plugging it into the computer and installing the software, connect your VHS recorder to the Grabster. Start the video capture program on your PC and press play on the video. You should see the footage in the capture window and hear the audio.

The software allows you to convert the captured signal into several formats, which in turn dictate how much disk space you'll need. Here's a quick comparison chart showing the standard formats on offer and the amount of disk space they use:

Format	Disk space per minute of footage
DVD High Quality	55MB
DVD Normal Quality	37MB
DVD Long Play	23MB
SVCD	20MB
VCD	10MB

There's no live preview available when you record to VCD format, which means you must judge when to start and stop the VCR by looking at the time index on the video's own display.

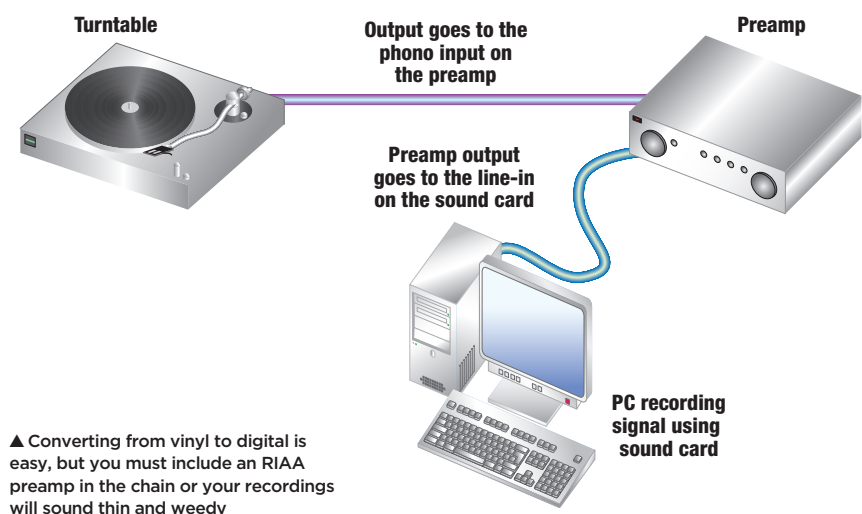


▲ Easy to use but powerful, the software with the Terratec Grabster can record in many different formats



▲ DVD MovieFactory, included with Terratec's Grabster, is easy to use and offers a variety of attractive effects

Change your tune Using a preamp to record vinyl



Once you have all the footage on your hard disk, the next task is to edit it down, remove any glitches between shots, create a running order, add titles and any transition effects you want, and finally burn it all to disc. There's a huge choice of software available that you can use to do this.

If you've got a hardware converter, you'll probably find that it came with a dedicated video-production tool. Just in case it didn't, Windows XP and Vista provide Microsoft Movie Maker. Vista Home Premium also includes DVD Maker. This enables you to create a user-friendly menu system so that people viewing your finished DVD can navigate the material on it.

The Terratec Grabster comes with Ulead's DVD MovieFactory 5 software. This beginner-friendly package can brighten up gloomy footage at the click of a button and generate DVDs using 16 built-in templates.

DIGITISING YOUR VINYL

If some of your favourite music resides in your vinyl collection but has not been reissued on CD, all is not lost. There are a range of techniques that will enable you to listen to your long-lost 33s, 45s and even 78s in no time. Of course, in the UK it is illegal to make copies of copyrighted music even for your own personal use, so you should use the information that follows wisely.

The first step is to clean the records you intend to copy. This can be as simple as running a lint-free cloth, such as those supplied with new spectacles, over the surface. There are also several specialised vinyl cleaning fluids on the market, which you spray on and either wipe or wash off.

The biggest problem facing you may not be dust and grime, but warping. Even a moderately warped record should still play, but it will depend largely on whether or not the turntable you use is in good working order. A poorly aligned cartridge or a worn stylus can cause a warped or very slightly scratched record to jump. The components of the tone arm may look OK, but if in doubt take it to a hi-fi shop to have it checked out and, if needs be, have the stylus changed. You'll also need a preamp, without which your copies will sound anaemic.

In 1954, the Recording Industry Association of America (RIAA) specified an equalisation format for vinyl that enables it to hold the maximum possible recording length. It's useful to think of RIAA equalisation as a form of analogue compression. Loud bass notes need a wider groove to accommodate the associated amplitude information. If a song was recorded with all its frequencies at their original volume, it would not be possible to fit as much music on the surface of a record than if they are reduced in volume. RIAA equalisation attenuates the bass end without removing it completely.

If you were to plug a turntable straight into the sound card of your computer, your records would sound very thin. It's the job of a preamp to boost the attenuated frequencies. When hi-fis had separate tape decks, amplifiers and radio tuners, the power amplifier would have a socket marked 'phono', into which you would plug the turntable. An RIAA preamp is attached to this connection, thus boosting the sound coming from the vinyl before sending it to the graphic equaliser.

A preamp is a vital part of the setup for recording from vinyl. If you have a friend who's a hi-fi buff and has maintained his vinyl collection, you could use his preamp, but even if you end up buying one a high-fidelity model is quite cheap.

A quick scan of a few price comparison sites reveals some for sale for under £25. If you're handy with a soldering iron, places such as Maplin even sell kits and modules for under £10.

So now we have the records, the deck has been aligned, the needle is new and we have a preamp that will give us the best possible bass reproduction without going overboard on cost. It's time to think about the sound card that will convert the sound into bits and bytes.

There's some debate among audiophiles about the ideal bit rate at which to record vinyl. Fortunately, whoever you listen to, a normal 16-bit, 44.1kHz sound card should be up to the task. The analogue signal needs to go to the line-in socket and not the mic-in socket. This might be a problem for users of certain laptops, which sometimes have only the mic-in option. However, you can overcome this problem by buying an external USB audio interface that will take a line input. The Behringer UCA202, which costs less than £25, will do the job.

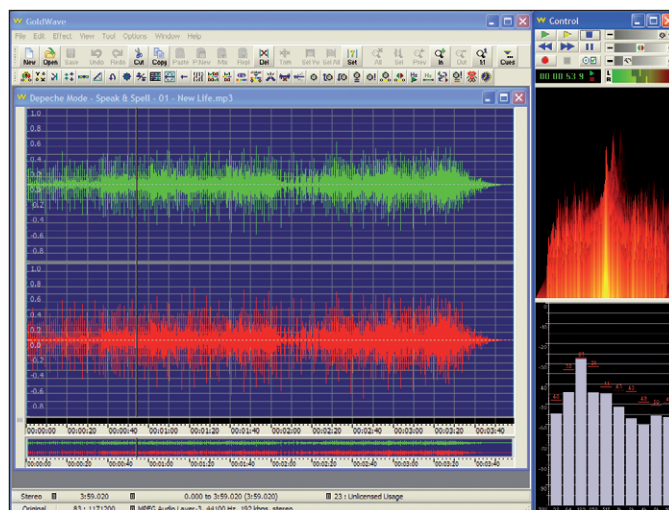
The quality of your sound card will be reflected in the quality of your recordings. An unbranded AC97 chipset built into the motherboard might be suitable for playing games, but the quality of its sound-sampling might leave you disappointed. A slightly more expensive card, such as one of the Creative Sound Blaster range, will give better results.

VOLUME CONTROL

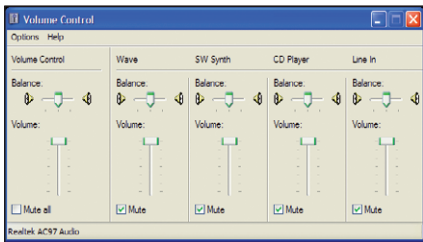
When trying to record your vinyl, you may find there is a problem with extraneous noise. This could come from both the computer and the mains electricity supply. If you have this problem, the first port of call is the PC's Master Volume control. Mute everything apart from the line-in input. Doing this should ensure you pick up as little noise as possible from the sound card. For more on taking control of your audio inputs, read *Advanced Windows*, *Shopper* August 2007.

If you hear mains hum or other noises in the background of your recordings, try physically moving the audio cables away from any power cables, turn the monitor off if it's an older CRT model and look at what other electrical equipment is in the vicinity. Washing machines can create random interference, as can mobile and cordless phones, for instance.

If there's still a hum problem, plug all the equipment into one wall outlet using a multi-way mains adaptor. This means that all stages in the recording chain will share the same earth



◀ Low-cost software such as GoldWave lets you record your old vinyl and brings the sound up to date, too



▲ The first point of call when trying to solve noisy recordings is the volume control panel. Here you should mute everything you don't need

connection, which can sometimes cure the problem. If the hum persists, check the earth on the PC. Check the mains plug and also take the side off the case to make sure there are no green and yellow earth tags left dangling. Ensure that any you find are all connected to the chassis.

If you can't locate the source of the problem, there's always a technological solution in the form of a ground loop isolator. Cheaper models cost under £10, which, if you can't solve the problem in other ways, is money well spent. If you still have a problem, there's also a software solution (see 'Noise removal', below).

We're now ready to hit record. Though you can use just about any freeware, shareware or commercial recording program to create audio files, it's not a good idea to try using Windows' own Sound Recorder. This records directly into RAM and is useful only for creating small snippets of sound. As 16-bit audio would use around 10MB of RAM per minute, this is inadequate. To demonstrate how to record your vinyl, we are going to use the very reasonably priced GoldWave, which costs approximately £24 from www.goldwave.com. This has a number of useful features that can be used to clean up the recording later.

It always pays to have a dummy run when setting up your recording so that you can set the sound level. The last thing you want is distortion on the recordings you make. It is possible to record a track, discover it is too quiet and then to increase its volume digitally using an audio editor. However, if a recording is made at too high a volume level, there will be distortion. Reducing the volume of a distorted recording won't get rid of the problem; it will just be quieter distortion.

A good tip here is to listen to the album you want to record to find the loudest part. At this point, you should monitor the input level coming from the preamp to the PC. It should be as high as possible without causing distortion. Hit the New button in GoldWave, and you'll see a pop-up window asking for the bit rate, length of recording and so on. Simply select the 'Vinyl LP record to CD, one side' preset and then press the OK button. If it's not already displayed, click on the Tools menu and select the control window. This window contains the recording and playback controls.

Set the needle in the groove on the record and press the red record button in the control window. Let one side of the album play all the way through without interruption. It's important not to make any heavy movements during the recording, because the needle is sensitive to vibrations and may pick them up or even make the record jump.

Once you've recorded the album, play back the recording and listen to the sound quality.

Burn a CD and listen to it on your domestic player. It may be that you enjoy hearing all the vinyl crackles and other surface noise, but if they are excessively loud, or you just want a cleaner recording, help is at hand.

NOISE REMOVAL

Load the captured audio in GoldWave and click on the Effect pull-down menu. Select the Filter option and choose Pop/Click. This filter works by detecting the abrupt changes in audio output that signal surface noise and digitally alters that split second of the recording to remove the noise.

The pop filter has a couple of presets you can try, but you can also move the slider to decide just how sensitive it should be. Depending on the damage to the original vinyl, you may have to try the filter on more aggressive settings, but the results can be very good. Processing audio in this way requires a lot of number crunching, however, and on slower machines it could take a few minutes to complete.

Some audio-editing programs are able to apply noise-removal effects. Return to the filter menu, select Noise Reduction and a pop-up will appear. Select the Hiss removal preset and press OK. There's a hum removal option there, too, in case you didn't manage to get rid of all the mains hum earlier. These operations may take several minutes each, but the resulting quality improvement can be significant.

The next step is to maximise the volume. This is a simple operation, but it requires the software to analyse the whole recording first, to see where the loudest part is. Click on the Effect pull-down menu, select the Volume option and choose Maximise Volume. GoldWave will take a moment to analyse the file before producing a pop-up window displaying the maximisation options. Select the Full Dynamic Range preset and press OK. It'll take a few minutes to process the entire file, but the recording should now be noticeably louder without adding any distortion.

If you're happy with the quality of the recording, it's time to cut the audio into tracks and save them, ready for burning on to a CD. Zoom in on the display of the recording either using the options on the View menu or the mouse wheel, if yours has one. Simply put your mouse pointer at the start of the first track and drag it to the area of silence that appears before the second track starts. This will result in a section of the recording being highlighted.

Right-click the mouse and you'll see an option to play the selection. You can also adjust the position of the start and end points of the selection to make sure you have all the audio for the track, and no more. To save the selection,



▲ A USB turntable such as the Ion ITT USB05 can turn vinyl recordings into digital ones

click the File menu and select the 'Save Selection As...' option. This produces a window that also lets you choose the audio file format. Most modern CD players will play both MP3 and Windows media files. For a full-quality, lossless option, choose Wav. Windows Media Player or iTunes can burn the files to a CD-R, if you want to play albums using a regular CD player rather than a computer-driven media centre.

ALTERNATIVE ROCK

For readers with deeper pockets, there's a neat alternative to connecting a turntable and a preamp to the computer in the form of a USB turntable. You can buy one for around £100. This sounds a lot, but they do take care of RIAA pre-amplification and they give you a digital signal path from the earliest possible point in the recording chain.

Cheaper USB turntables operate at 33rpm and 45rpm, but come with software for recording from 78rpm records. They do this by recording 78s at 45rpm and digitally processing the captured sound to speed it up after recording. This does mean that you can't play 78s in real time. You'll also need a special 78 stylus for playing your old shellac platters, which will set you back an extra £12 or so. Budget for more, and you can buy a USB turntable with native 78rpm support.

VERDICT

If you have precious memories on cassette tape, or a large record collection you'd like to access again, you may have been disheartened by the revolution in digital media and the fall from grace of older formats. However, it isn't difficult to transfer analogue video and music to digital formats to enjoy for years to come. While dedicated hardware such as dual VHS and DVD recorders and USB turntables will give you the best-quality transfers, the results you can get from a mish-mash of redundant or borrowed equipment can still be very good indeed.

Digital vision Glossary of terms

RIAA equalisation	An equalisation standard used to get the most recording time from vinyl
S-video	Video input and output system characterised by a small DIN connector
Composite video	A standard for analogue video and sound interchange; characterised by a cable with three phono plugs at each end, usually coloured red, white and yellow
SVCD	Super Video Compact Disc, a digital format for storing video and audio. It falls between CD and DVD in terms of capacity and quality
VCD	An older CD video format, which should be playable in all computers and most modern DVD players
Preamp	A small preamplifier that compensates for RIAA equalisation on records to restore the sound to its original glory